

Applic. No. : 09/761,240

Remarks:

Reconsideration of the application is requested.

Claims 1-4 remain in the application. Claims 1-4 have been amended.

Enclosed is a copy of the cover page of US 6,455,911 which corresponds to the reference EP 0760 528 cited in the filed IDS.

In item 2 on page 4 of the above-identified Office action, claims 2-3 have been objected to because of an informality. The Examiner stated that "said foreign atoms" should be replaced by "said atoms". The Examiner's comments have been noted and claims 2-3 have been amended as suggested.

The above-noted changes to claims 2-3 are provided solely for the purpose of satisfying formal requirements, clarification, or are made solely for cosmetic reasons to clarify the claims. The changes are neither provided for overcoming the prior art nor do they narrow the scope of the claim(s) for any reason related to the statutory requirements for a patent.

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In item 2 on page 4 of the Office action, claims 1-4 have been rejected as being anticipated by *Stephani et al.* (EP 0760 528) [which corresponds to US 6,455,911] under 35 U.S.C. § 102.

In item 3 on page 5 of the Office action, claim 1 and 3-4 have been rejected as being anticipated by *Gerstenmaier et al.* (DE 39 17 769) under 35 U.S.C. § 102.

In item 4 on page 6 of the Office action, claim 1 has been rejected as being anticipated by *Francis et al.* (US 6,043,112) under 35 U.S.C. § 102.

The rejections and the Examiner's comments have been noted and claims 1 and 4 have been amended in an effort to even more clearly define the invention of the instant application. Support for the changes is found on page 1, lines 21-22, and in the last paragraph on page 3 of the specification.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 (similarly claim 4) as amended calls for, inter alia:

an emitter region;

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a stop zone in front of the emitter region for **preventing passage of an electric field to said emitter region at a reverse voltage;**

said emitter region and said stop zone having mutually opposite conductivities; and

said stop zone having atoms of a doping substance determining a conductivity of said stop zone, said atoms of said doping substance having at least one energy level within the band gap of the semiconductor and at least 200 meV away from both a conduction band and a valence band of the semiconductor wherein **a number of effective doping atoms** generated in the stop zone **changes in dependence on whether** the power semiconductor element is in a blocking operation or in a conducting operation.

As stated on page 3 of the instant application, the inventive concept of the invention of the instant application is:

based on the principle that the stop zone needs to be "active" only in the off state of the circuit element, but not during its conducting operation. In other words, the number of effective doping atoms generated by the disruption in the stop zone should change dependent on the type of operation (blocking operation or conducting operation) of the circuit element. This is achieved in that energy levels are created by the doping atoms which, within the band gap of the semiconductor material, lie far away from the energy levels of the conduction band and the valence band.

In the *Response to Amendment* on pages 3-4 of the Office action, the Examiner stated that "the examiner realizes that the purpose of the ion implanted in the device taught by

Francis is different from that Applicant (lifetime killing rather than reduction of the blocking voltage)." *Francis et al.* do not disclose (or suggest) a stop zone preventing passage of an electric field to the emitter region at a reverse voltage and wherein the number of effective doping atoms generated (by the disruption) in the stop zone changes dependent on whether the power semiconductor element is in a blocking operation or in a conducting operation.

In item 2 on page 4 of the Office action, the Examiner stated that *Stephani et al.* "teach (cf. Figure 1) a power conductor element ... [with] a stop zone 4 in front of the emitter region". However, in *Stephani et al.* reference sign 4 denotes a "junction termination" and not a stop zone as recited in the claims.

In item 3 on page 5 of the Office action, the Examiner stated that *Gerstenmaier et al.* "teach (cf. Figure 1) a power conductor element ... [with] a stop zone 11a/11b in front of the emitter region". The element(s) with the reference signs 11a/11b in *Gerstenmaier et al.* are referred to as emitter-side-connection (Emitter-Nebenanschlüssen). *Gerstenmaier et al.* do not disclose or suggest - as far as Applicant was able to ascertain - a stop zone as recited in the claims.

Clearly, neither *Stephani et al.*, *Gerstenmaier et al.*, nor *Francis et al.* show a stop zone as recited in claims 1 and 4 of the instant application. Therefore, the invention as recited in claims 1 and 4 of the instant application is believed not to be anticipated by the references.

It is accordingly believed to be clear that neither *Stephani et al.*, *Gerstenmaier et al.*, nor *Francis et al.* show the features of claims 1 and 4. Claims 1 and 4 are, therefore, believed to be patentable over the art and because claims 2-3 are ultimately dependent on claim 1, they are believed to be patentable as well.

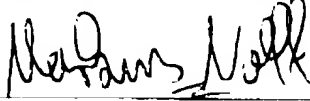
In view of the foregoing, reconsideration and allowance of claims 1-4 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, the Examiner is respectfully requested to telephone Counsel so that, if possible, patentable language can be worked out. In the alternative, the entry of the amendment is requested as it is believed to place the application in better condition for appeal, without requiring extension of the field of search.

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Please charge any fees which might be due with respect to
Sections 1.16 and 1.17 to the Deposit Account of Lerner and
Greenberg, P.A., No. 12-1099.

Respectfully submitted,



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Version with markings to show changes made:

Claim 1 (twice amended). A power semiconductor element,
comprising:

an emitter region;

a stop zone in front of the emitter region for preventing
passage of an electric field to said emitter region at a
reverse voltage;

said emitter region and said stop zone having mutually
opposite conductivities; and

said stop zone having atoms of a doping substance determining
a conductivity of said stop zone, said atoms of said doping
substance having at least one energy level within the band gap
of the semiconductor and at least 200 meV away from both a
conduction band and a valence band of the semiconductor
wherein a number of effective doping atoms generated in the
stop zone changes in dependence on whether the power
semiconductor element is in a blocking operation or in a
conducting operation.

Claim 2 (amended). The power semiconductor element according to claim 1, wherein said [foreign] atoms in said stop zone include sulfur atoms.

Claim 3 (amended). The power semiconductor element according to claim 1, wherein said [foreign] atoms in said stop zone include selenium atoms.

Claim 4 (amended). A power semiconductor element, comprising:

an emitter region;

a stop zone in front of the emitter region for preventing passage of an electric field to said emitter region at a reverse voltage;

said emitter region and said stop zone having mutually opposite conductivities; and

said stop zone containing foreign atoms selected from the group consisting of sulfur and selenium with at least one energy level within the band gap of the semiconductor and spaced at least 200 meV from a conduction band and a valence band of the semiconductor wherein a number of effective doping atoms generated in the stop zone changes in dependence on

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whether the power semiconductor element is in a blocking
operation or in a conducting operation.